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(54) **Separating device, fixing device, medium conveying device and image forming apparatus**

Trennvorrichtung, Fixiervorrichtung, Medienübertragungsvorrichtung und Bilderzeugungsvorrichtung

Dispositif de séparation, dispositif de fixation, dispositif transportant un support et appareil de formation d'images

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a separating device, a fixing device, a medium conveying device, and an image forming apparatus.

[0002] Conventionally, in an image forming apparatus such as a laser printer or a copier, a sheet (i.e., a medium) is fed by a feeding cassette, and then conveyed by registration rollers to an image forming portion while a skew of the sheet is corrected. The image forming portion transfers a toner image to the sheet, and conveys the sheet to a fixing device. The fixing device fixes the toner image to the sheet by applying heat and pressure.

[0003] For example, Japanese Laid-open Patent Publication No. 2006-126876 discloses a separating claw for separating the sheet adhering to a roller.

[0004] However, in the conventional art, an end portion of the separating claw is apart from a surface of the roller while the sheet passes the separating claw. Therefore, a thin sheet having a tendency to wind around the roller may enter into a gap between the separating claw and the surface of the roller, which may cause a jam of the sheet.

[0005] US6205316 B1 describes a fixing apparatus having a heat roller, a paper separating lug and a guide roller. The separating lug is rotatably mounted onto a shaft so that the paper separating lug is moveable between a first and second position. Whilst in the first position the lug contacts a heat roller and when in the second position the lug is out of contact with the heat roller. The guide roller is rotatably mounted to the lug.

[0006] JP2001/235958 A describes a fixing device having a heating roller, a separation pawl and a roller body. The separation pawl is provided for separating a sheet P from the heating roller. The tensioned paper exerts a force on the separating pawl as a pressing force. This moves the roller body downwards and reduces the pressure and frictional resistance between the roller body and paper.

SUMMARY OF THE INVENTION

[0007] The present invention is intended to solve the above describe problems, and an object of the present invention is to provide a separating device, a fixing device, a medium conveying device and an image forming apparatus capable of surely separating a thin medium.

[0008] According to an aspect of the present invention, there is provided a separating device including a carrying-out portion for carrying-out a medium, a conveying portion for conveying the medium carried out by the carrying-out portion, and a separating portion provided between the carrying-out portion and the conveying portion so as to be rotatable about a rotation fulcrum. The separating portion has an end portion which is contactable and separable with the carrying-out portion. The end portion of the separating portion contacts the carrying-out portion to thereby separate the medium from the carrying-out portion. The separating portion includes a first guiding portion rotatably provided for guiding the medium separated from the carrying-out portion to the conveying portion and a second guiding portion rotatably provided for guiding the medium separated from the carrying-out portion to the conveying portion. The first guiding portion has a rotation center which is located on the carrying-out portion side with respect to the rotation fulcrum of the separating portion. When a straight line is defined by connecting a contact area of the carrying-out portion and a contact area of the conveying portion, the rotation center of the first guiding portion is located on the straight line side with respect to the rotation fulcrum of the separating portion.

[0009] The second guiding portion has a rotation centre which is located on the conveying portion side with respect to the rotation fulcrum and is located on the straight line side with respect to the rotation fulcrum of the separating portion. A distance between the rotation centre of the first guiding portion and the rotation fulcrum is larger than a distance between the rotation centre of the second guiding portion and the rotation fulcrum. The distances are projected onto a straight line defined by connecting the lower end of the outer circumference of the first guiding portion and the contact area of the conveying portion.

[0010] As described above, the first guiding portion is provided on the separating portion at a position different from the rotation fulcrum. Further, when the leading end of the medium contacts the first guide portion, the biasing portion causes the separating portion to rotate with a relatively small force applied by the leading end portion of the medium. Therefore, the separating portion is apart from the carrying-out portion for a short time interval while the leading end portion of the medium passes the first guiding portion. Therefore, even when the medium (for example, a thin medium) has a tendency to wind around the carrying-out portion, the separating portion separates the medium from the carrying-out portion, and therefore the occurrence of the jam can be prevented.

[0011] Further, the separating portion separates from the carrying-out portion only when the medium passes the carrying-out portion, and therefore deposition of extraneous matter on the separating portion is not likely to occur. As a result, a surface and a back surface of the medium can be prevented from being smeared with the extraneous matter.

[0012] Furthermore, the separating portion can rotate about the rotation fulcrum along the conveying direction of the medium so as to move the separating portion apart from the carrying-out portion, and therefore a force applied to the separating portion by the medium when the medium contacts the first guide portion can be dispersed in the conveying direction of the medium. Therefore, wrinkling, folding and jam of the medium (that may otherwise occur when the medium contacts the first guide portion)

can be prevented.

[0013] According to another aspect of the present invention, there is provided a separating device including a fixing portion that fixes a developer to a medium and carries out the medium therefrom, a conveying portion provided on downstream side of the fixing portion in a conveying direction of the medium, a separating portion provided between the fixing portion and the conveying portion, and a biasing portion that biases the separating portion in a direction in which the separating portion contacts the fixing portion. The separating portion includes a separating claw biased by the biasing portion to contact the fixing portion so as to separate the medium from the fixing portion, a first guiding portion rotatably provided on the separating claw so as to protrude from a first straight line connecting a contact area of the fixing portion and a contact area of the conveying portion, and a rotation fulcrum provided on downstream side of the first guiding portion in the conveying direction of the medium. The rotation fulcrum supports the separating claw so that the separating claw is movable to contact with or separate from the fixing portion.

[0014] According to still another aspect of the present invention, there is provided a medium conveying device including the above described separating device. The medium conveying device further includes a medium operating portion that performs a predetermined operation on the medium, and supplies the medium to the separating device.

[0015] According to yet another aspect of the present invention, there is provided a fixing device including the above described separating device. The fixing portion includes a heat roller that heats the medium when the medium passes the heat roller, and a pressure roller that applies a pressure to the medium between the heat roller and the pressure roller.

[0016] According to further aspect of the present invention, there is provided an image forming apparatus including the above described separating device. The image forming apparatus further includes an image forming portion that forms a developer image using a developer, transfers the developer image to the medium, and supplies the medium with the developer image to the separating device.

[0017] According to still further aspect of the present invention, there is provided an image forming apparatus wherein the image forming portion includes a developer storage portion storing the developer, an image bearing body that bears a latent image, an exposure unit that forms the latent image on the image bearing body to form the developer image, and a transferring portion that transfers the developer image from the image bearing body to the medium and supplies the medium to the separating device.

[0018] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In the attached drawings:

FIG. 1 is a schematic view showing a configuration of an image forming apparatus according to the first embodiment of the present invention;
FIG. 2 is a sectional view showing a configuration of a fixing device of the image forming apparatus according to the first embodiment;
FIG. 3 is a perspective view showing a separating claw unit according to the first embodiment;
FIG. 4 is an enlarged perspective view showing a separating claw end and its surroundings according to the first embodiment;
FIG. 5 is a side view for illustrating a protruding amount of a lower end of an outer circumference of a guide roller from a straight line connecting contact areas of a fixing portion and a conveying portion;
FIG. 6 is a schematic view showing a first state during a passage of a sheet through the fixing portion according to the first embodiment;
FIG. 7 is a schematic view showing a second state during the passage of the sheet through the fixing portion according to the first embodiment;
FIG. 8 is a schematic view showing a third state during the passage of the sheet through the fixing portion according to the first embodiment;
FIG. 9 is a schematic view showing a state where a jam of the sheet occurs;
FIG. 10 is a sectional view showing a configuration of a fixing device according to the second embodiment of the present invention;
FIG. 11 is a perspective view showing a separating claw unit according to the second embodiment;
FIG. 12 is a schematic view showing a first state during a passage of a sheet through the fixing portion according to the second embodiment;
FIG. 13 is a schematic view showing a second state during the passage of the sheet through the fixing portion according to the second embodiment;
FIG. 14 is a schematic view showing a third state during the passage of the sheet through the fixing portion according to the second embodiment, and
FIG. 15 is a schematic view showing a positional relationship between components according to the second embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] Hereinafter, embodiments of the present invention will be described with reference to drawings.

FIRST EMBODIMENT.

[CONFIGURATION]

[0021] FIG. 1 is a schematic view showing a configuration of an image forming apparatus 10 according to the non-claimed first embodiment of the present invention.

[0022] The image forming apparatus 10 is configured as, for example, an electrophotographic page printer. The image forming apparatus 10 includes a sheet cassette (i.e., a medium cassette) 11 in which sheets P as media are stored. The sheet cassette 11 is detachably mounted to a lower part of the image forming apparatus 10. A pickup roller 12 is rotatably provided above the sheet cassette 11, and the pickup roller 12 is pressed against the uppermost sheet of the sheets P stored in the sheet cassette 11. A conveying roller 13 and a retard roller 14 are provided so as to face each other in the vicinity of the pickup roller 12. The conveying roller 13 and the retard roller 14 convey the sheet P upward from the sheet cassette 11.

[0023] A conveying roller pair 15 (i.e., a pair of conveying rollers) is rotatably provided above the conveying roller 13 and the retard roller 14. Further, a conveying roller pair 16 is rotatably provided on downstream side of the conveying roller pair 15 along a conveying path of the sheet P. The conveying roller pair 16 conveys the sheet P to an image forming portion 17 provided on further downstream side of the conveying roller 16.

[0024] Hereinafter, the terms "downstream" and "upstream" will be used to respectively refer to downstream direction and upstream direction along the conveying path of the sheet P (i.e., a path along which the sheet P is conveyed) shown by a dashed line in FIG. 1. Further, the terms "above" and "below" are defined based on a vertical direction.

[0025] The image forming portion 17 includes a toner cartridge 17a as a developer storage portion, a recording head 17b as an exposure unit, a photosensitive drum 17c as an image bearing body, a charging roller 17e as a charging member, a developing roller 17f as a developer bearing body, a developing blade (not shown) as a developer layer forming member, a supplying roller 17g as a developer supplying member, and a transfer roller 17d as a transferring portion. The image forming portion 17 is configured to form a toner image (as a developer image) in accordance with a printing job data, and transfer the toner image to the conveyed sheet P.

[0026] The toner cartridge 17a stores a toner as a developer to be supplied to other portion of the image forming portion 17. The photosensitive drum 17c bears a latent image which is developed (i.e., visualized) using the toner supplied by the developing roller 17f. The charging roller 17e uniformly charges a surface of the photosensitive drum 17c. The recording head 17b emits light to expose the surface of the photosensitive drum 17c to form a latent image thereon. The developing roller 17f develops the latent image by supplying the toner to the photosensitive drum 17c so as to form a toner image as a developer image. The developing blade regulates a thickness of the toner layer on the developing roller 17f. The supplying roller 17g supplies the developer to the developing roller 17f.

[0027] The transfer roller 17d transfers the toner image as the developer image from the photosensitive drum 17c to the sheet P, and conveys the sheet P to a fixing device 50 as a separating device.

[0028] The fixing device 50 as the separating device is provided on downstream side of the image forming portion 17. The image forming portion 17 further includes a conveying belt unit 17h as a medium operating portion that conveys the sheet P at a predetermined timing and supplies the sheet P to the fixing device 50. The conveying belt unit 17h (as the medium operating portion) and the fixing device 50 (as the separating device) constitute a medium conveying device.

[0029] The fixing device 50 includes a fixing portion 30 as a carrying-out portion, and a separating claw unit 40 as a separating portion that separates the sheet P (carried out by the fixing portion 30) from the fixing portion 30, a spring 43 as a biasing portion that biases the separating claw unit 40 in a direction in which the separating claw unit 40 contacts the fixing portion 30, and a conveying roller pair 18 as a conveying portion that conveys the sheet P having passed the separating claw unit 40.

[0030] The fixing portion 30 is configured to fix the toner image (having been transferred to the sheet P) to the sheet P by application of heat and pressure. The fixing portion 30 includes a heat roller 31, and a pressure roller 32 pressed against the heat roller 31.

[0031] The conveying roller pair 18 is provided on downstream side of the fixing portion 30. An ejection roller pair 19 is provided above the conveying roller pair 18. The ejection roller pair 19 is configured to eject the sheet P to the outside of the image forming apparatus 10. An ejection tray 20 is provided on a top of the image forming apparatus 10 for stacking the sheet P ejected by the ejection roller pair 19.

[0032] Sensors 21, 22 and 23 are provided for detecting positions of the sheet P. The sensor 21 is provided in the vicinity of and on upstream side of the conveying roller pair 16. The sensor 22 is provided between the conveying roller pair 16 and the transfer roller 17d. The sensor 23 is provided between the fixing portion 30 and the conveying roller pair 18.

[0033] FIG. 2 is a sectional view showing a configuration of the fixing device 50 according to the first embodiment. FIG. 3 is a perspective view showing the separating claw unit 40 according to the first embodiment.

[0034] As shown in FIG. 2, the fixing portion 30 includes a rotatable heat roller 31, and a rotatable pressure roller 32 provided below the heat roller 31. The pressure roller 32 is pressed against the heat roller 31 by means of a spring 36 (shown by a dashed line in FIG. 2) as a biasing member. The fixing portion 30 further includes a fixing portion cover 33 covering the heat roller 31 and the pres-

sure roller 32. A stopper 33a is provided on an end of the fixing portion cover 33. The stopper 33a contacts an upper part of the separating claw unit 40 so as to limit a rotation of the separating claw unit 40. The heat roller 31 has a halogen lamp 31a as a heat source therein.

[0035] As shown in FIGS. 2 and 3, the separating claw unit 40 is provided so as to be rotatable with respect to the fixing portion cover 33. The separating claw unit 40 has a function to separate the sheet P from the heat roller 31 when the sheet P adheres to and winds around the heat roller 31.

[0036] The separating claw unit 40 as the separating portion includes a separating claw 41 and a guide roller 42 as a first guide portion. The separating claw 41 includes a separating claw end 41a, a rotation fulcrum 41b, a rotation center 41c and a separating claw projection 41d. The separating claw unit 40 as the separating portion is rotatable about the rotation fulcrum 41b with respect to the heat roller 31 of the fixing portion 30 as the carrying-out portion. Further, the spring 43 as the biasing portion biases the separating claw unit 40 to cause the separating claw unit 40 to rotate in a direction (counterclockwise in FIG. 2) in which the separating claw end 41a contacts the heat roller 31. The guide roller 42 as the first guide portion is rotatable about the rotation center 41c with respect to the separating claw unit 40. The separating claw projection 41d (see FIG. 3) is located at a position to abut against the stopper 33a to thereby limit the rotation of the separating claw unit 40 in a direction in which the separating claw end 41a separates (moves away) from the heat roller 31.

[0037] The separating claw end 41a of the separating claw 41 has a pointed shape narrowing toward the heat roller 31. The guide roller 42 as the first guide portion guides the sheet P having been separated from the heat roller 31 by the separating claw 41. The separating claw projection 41d is formed on the upper part of the separating claw 41 to which the spring 43 as the biasing member is mounted. The rotation fulcrum 41b is located on a substantially center of the separating claw 41. The rotation fulcrum 41b is supported by the fixing portion cover 33, and rotatably supports the separating claw unit 40.

[0038] As shown in FIG. 2, the rotation center 41c of the guide roller 42 is located below the rotation fulcrum 41b of the separating claw 41, and is located on the heat roller 31 side with respect to the rotation fulcrum 41b of the separating claw 41. A lower end of an outer circumference of the guide roller 42 protrudes downward from a straight line L0 (see FIG. 5) connecting a contact area 34 (in this example, a nip portion) of the fixing portion 30 and a contact area 18d (in this example, a nip portion) of the conveying roller pair 18.

[0039] The separating claw 41 is so shaped that a part of the separation claw 41 on downstream side of the guide roller 42 does not protrude downward from a straight line L1 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d of the conveying roller pair 18. The spring 43 is provided above the rotation fulcrum 41b of the separating claw 41. The spring 43 biases the separating claw 41 to the left in FIG. 1, i.e., in a direction to rotate the separating claw 41 counterclockwise so that the separating claw end 41a is pressed against the heat roller 31.

[0040] The conveying roller pair 18 is provided on downstream side of the separating claw unit 40. The conveying roller pair 18 includes a rotatable conveying roller 18a, and a rotatable pinch roller 18b provided above the conveying roller 18a. The pinch roller 18b is pressed against the conveying roller 18a by a spring 18c with a predetermined biasing force.

[0041] FIG. 4 is an enlarged perspective view showing the separating claw end 41a of the separating claw unit 40 and its surroundings.

[0042] As described above, the separating claw end 41a, the rotation fulcrum 41b, the guide roller 42, and the rotation center 41c of the guide roller 42 are provided on a lower part of the separating claw unit 40. The separating claw end 41a has an end surface 41e that contacts the heat roller 31. The end surface 41e has a small surface area. With such a configuration, toner is not likely to be deposited on the end surface 41e of the separating claw end 41a. Therefore, a surface and a back surface of the sheet P can be prevented from being smeared with the toner.

[0043] FIG. 5 is a schematic view for illustrating a protruding amount of the lower end of the outer circumference of the guide roller 42 with respect to the above described line L0.

[0044] As shown in FIG. 5, the lower end of the outer circumference of the guide roller 42 protrudes downward from the straight line L0 connecting the nip portion 34 (as the contact area) of the fixing portion 30 and the nip portion 18d (as the contact area) of the conveying roller pair 18. To be more specific, the straight line L0 is defined by connecting a terminal point of the nip portion 34 between the heat roller 31 and the pressure roller 32 and a starting point of the nip portion 18d between the conveying roller 18a and the pinch roller 18b. The lower end of the outer circumference of the guide roller 42 protrudes downward from the straight line L0.

[0045] If the heat roller 31 and the pressure roller 32 contact each other at a point (referred to as a first contact point) without forming the nip portion 34, and the conveying roller 18a and the pinch roller 18b contact each other at a point (referred to as a second contact point) without forming the nip portion 18d, the straight line L0 is defined by connecting the first contact point and the second contact point. If the heat roller 31 and the pressure roller 32 form the nip portion 34, and the conveying roller 18a and the pinch roller 18b form the nip portion 18d, the straight line L0 is defined by connecting the terminal point of the nip portion 34 and the starting point of the nip portion 18d.

[0046] If the heat roller 31 and the pressure roller 32 form the nip portion 34, and the conveying roller 18a and the pinch roller 18b contact each other at the second

contact point without forming the nip portion 18d, the straight line L0 is defined by connecting the terminal point of the nip portion 34 and the second contact point. If the heat roller 31 and the pressure roller 32 contact each other at the first contact point without forming the nip portion 34, and the conveying roller 18a and the pinch roller 18b form the nip portion 18d, the straight line L0 is defined by connecting the first contact point and the starting point of the nip portion 18d.

[OPERATION OF IMAGE FORMING APPARATUS]

[0047] An operation of the image forming apparatus 10 of the first embodiment will be described.

[0048] The sheet P is fed out of the sheet cassette 11 by the pickup roller 12, and is further conveyed by the conveying roller 13, the retard roller 14 and the conveying roller pairs 15 and 16 to reach the image forming portion 17. In the image forming portion 17, the charging roller 17e uniformly charges the surface of the photosensitive drum 17c. The recording head 17b receives a printing job (sent from a host device) via a not shown control unit, and emits light to expose the surface of the photosensitive drum 17 in accordance with a printing pattern, so as to form a latent image on the surface of the photosensitive drum 17.

[0049] The developing roller 17f is provided in contact with the photosensitive drum 17c, and causes the toner to adhere to the latent image on the surface of the photosensitive drum 17c so that a toner image is formed thereon. The toner image is transferred from the photosensitive drum 17c to the sheet P due to electric field between the photosensitive drum 17c and the transfer roller 17d. Then, the toner image is fixed to the sheet P by the fixing portion 30. The sheet P is ejected by the conveying roller pair 18 and the ejection roller pair 19 to the ejection tray 20.

[OPERATION OF FIXING DEVICE]

[0050] FIG. 6 is a schematic view for illustrating a first state of the separating claw unit 40 during the passage of the sheet P through the fixing portion 30.

[0051] The first state shown in FIG. 6 is a state after a leading end of the sheet P has passed the nip portion 34 between the heat roller 31 and the pressure roller 32, and just before the leading end of the sheet P reaches the guide roller 42.

[0052] The leading end of the sheet P having passed the nip portion 34 passes a vicinity of the heat roller 31, and is conveyed along a vicinity of the separating claw end 41a. The separating claw end 41a contacts the heat roller 31 by the force F of the spring 43 as the biasing member, and therefore it is ensured that the sheet P is separated from the heat roller 31 and conveyed along the separating claw end 41a, even when the sheet P is thin and has a tendency to wind around the heat roller 31. In this state, the separating claw end 41a is kept in contact with the heat roller 31. A rotational friction force of the guide roller 42 and the separating claw unit 40 (about the rotation fulcrum 41b) is expressed as F1. A force of the spring 43 (as the biasing member) when the separating claw end 41a contacts the heat roller 31 is expressed as F2. It is preferable to satisfy the relationship F1 < F2.

[0053] FIG. 7 is a schematic view for illustrating a second state of the separating claw unit 40 during the passage of the sheet P through the fixing portion 30.

[0054] The second state shown in FIG. 7 is a state where the leading end of the sheet P contacts the guide roller 42.

[0055] When the leading end of the sheet P (having been conveyed along the vicinity of the separating claw end 41a) contacts the guide roller 42, the separating claw unit 40 is forced by the sheet P, and rotates about the rotation fulcrum 41b resisting the force of the spring 43 so that the separating claw end 41a moves apart from the heat roller 31.

[0056] In this state, a separating amount "t" between the separating claw end 41a and the heat roller 31 is determined by a position of the separating claw 41 when the separating claw projection 41d on the upper part of the separating claw 41 contacts the stopper 33a provided on the fixing portion cover 33 in the vicinity of the separating claw projection 41d. The separating amount "t" is determined so that the separating claw end 41a having reached a lower end of a movable range thereof does not contact the sheet P.

[0057] When the leading end of the sheet P contacts the guide roller 42, the separating claw unit 40 is applied with a force F3 by the sheet P, and rotates clockwise. When a biasing force (i.e., a spring force) F4 of the spring 43 exceeds the force F3 (i.e., F4 > F3), the separating claw 41 is brought into contact with the heat roller 31 due to the force F4 of the spring 43.

[0058] In this regard, there may be a case where the biasing force F4 is smaller than the force F3 (i.e., F4 < F3) until the separating claw projection 41d abuts against the stopper 33a. However, even in such a case, when the separating claw projection 41d abuts against the stopper 33a, the guide roller 42 starts rotating, and therefore the force F3 (causing the separating claw unit 40 to rotate clockwise) decreases. Therefore, the force F3 becomes smaller than the biasing force F4 (i.e., F4 > F3), and the separating claw unit 40 is brought into contact with the heat roller 31 due to the biasing force F4 of the spring 43.

[0059] In other words, after the leading end of the sheet P has passed the guide roller 42, the separating claw unit 40 rotates counterclockwise by the biasing force of the spring 43, so that the separating claw end 41a contacts the heat roller 31.

[0060] Further, even if the sheet P is curled in the same direction as a curvature of the heat roller 31 or in the opposite direction, the separating claw unit 40 operates in a similar manner as described above when the leading

end of the sheet P (having been separated from the heat roller 31 by the separating claw end 41ad) contacts the guide roller 42.

[0061] FIG. 8 is a schematic view showing a third state of the separating claw unit 40 during the passage of the sheet P through the fixing portion 30.

[0062] The third state shown in FIG. 8 is a state where the guide roller 42 starts rotating clockwise by being forced by the sheet P and the leading end of the sheet P passes the guide roller 42, after the separating claw unit 40 has rotated to cause the separating claw unit end 41a to separate from the heat roller 31a.

[0063] In the third state shown in FIG. 8, after the sheet P has passed the guide roller 42, the force causing the separating claw unit 40 to rotate clockwise (in FIG. 8) disappears, and therefore the separating claw end 41a contacts the heat roller 31 due to the biasing force of the biasing spring 43. Thereafter, the sheet P is conveyed by the conveying roller pair 18 shown in FIG. 2. While the sheet P is conveyed by the conveying roller pair 18, the separating claw end 41a is kept in contact with the heat roller 31. Further, after a tail end of the sheet P has passed the separating claw 41, the separating claw end 41a is kept in contact with the heat roller 31.

[0064] FIG. 9 is a schematic view showing a state where a jam of the sheet P occurs.

[0065] As described above, after the leading end of the sheet P has passed the guide roller 42, the force causing the separating claw unit 40 to rotate clockwise disappears, and the separating claw end 41a contacts the heat roller 31 due to the biasing force of the spring 43 as shown in FIG. 8. In this regard, if the separating claw end 41a remains apart from the heat roller 31 after the leading end of the sheet P has passed the guide roller 42, and if the sheet P is a thin sheet having a tendency to wind around the heat roller 31, a part (for example, other than the leading end) of the sheet P may enter into a gap between the separating claw end 41a and the heat roller 31, which may cause a jam or the like to occur. In contrast, according to the first embodiment, the separating claw end 41a contacts the heat roller 31 after the leading end of the sheet P has passed the guide roller 42 as shown in FIG. 8, and therefore the occurrence of jam can be prevented.

[ADVANTAGES]

[0066] The first embodiment of the present invention provides the following advantages.

(1) The guide roller 42 is provided on the separating claw 41 at a different position from the rotation fulcrum 41b of the separating claw 41, and the spring 43 generates a relatively small biasing force and allows the rotation of the separating claw unit 40 when the guide roller 42 is forced by the leading end of the sheet P. With such a configuration, the separating claw end 41a moves apart from the heat roller 31 for a short time period when the leading end of the sheet P passes the guide roller 42. As a result, even when the sheet P is a thin sheet having a tendency to wind around the heat roller 31 and is not sufficiently separated from the heat roller 31, the separating claw end 41a can separates the sheet P from the heat roller 31. As a result, the occurrence of jam of the sheet P can be prevented.

(2) Further, the separating claw end 41a is apart from the heat roller 31 only when the sheet P passes the guide roller 42, and therefore deposition of the toner (or other extraneous matter) on the separating claw end 41a is not likely to occur. As a result, a surface and a back surface of the sheet P can be prevented from being smeared with the toner or other extraneous matter.

(3) Furthermore, by the rotation of the separating claw unit 40 about the rotation fulcrum 41b, the separating claw end 41a can move apart from the heat roller 31 along the conveying direction of the sheet P. Therefore, when the sheet P contacts the guide roller 42, the force applied to the separating claw unit 40 by the sheet P can be dispersed in the conveying direction of the sheet P. Therefore, wrinkling, folding or jam of the sheet P (that may otherwise occur when the sheet P contacts the first guide roller 42) can be prevented.

SECOND EMBBODIMENT.

[CONFIGURATION]

[0067] FIG. 10 is a sectional view showing a configuration of a fixing device 50A according to the claimed second embodiment of the present invention. FIG. 11 is a perspective view showing a separating claw unit 40A of the second embodiment. In FIGS. 10 and 11, elements that are the same as those of the first embodiment (FIGS. 2 and 3) are assigned the same reference numerals.

[0068] The fixing device 50A of the second embodiment has substantially the same configuration as the fixing device 50 of the first embodiment. The separating claw unit 40A of the fixing device 50A of the second embodiment is different from the separating claw unit 40 of the first embodiment in that the separating claw unit 40A has a guide roller 44 in addition to the guide roller 42. The guide roller 44 is provided on downstream side of the guide roller 42 that guides the sheet P having been separated from the heat roller 31 by the separating claw end 41a having the same configuration as in the first embodiment.

[0069] As shown in FIG. 10, the separating claw unit 40A as a separating portion includes a separating claw 41A, the guide roller 42 as a first guide portion and the guide roller 44 as a second guide portion. The separating claw 41A includes a separating claw end 41a, a rotation fulcrum 41b, a rotation center 41c, a separating claw projection 41d and a rotation center 41e. The separating

claw unit 40A as the separating portion is rotatable about the rotation fulcrum 41b with respect to the heat roller 31 of the fixing portion 30 as the carrying-out portion. Further, the spring 43 as the biasing portion biases the separating claw unit 40A so that the separating claw unit 40A rotates in a direction in which the separating claw end 41a contacts the heat roller 31. The guide roller 42 as the first guide portion is rotatable about the rotation center 41c with respect to the separating claw unit 40A. The guide roller 44 as the second guide portion is rotatable about the rotation center 41e with respect to the separating claw unit 40A. The separating claw projection 41d is provided so as to abut against the stopper 33a to limit the rotation of the separating claw unit 40A in a direction in which the separating claw end 41a moves away from the heat roller 31.

[0070] As described in the first embodiment, the rotation center 41c of the guide roller 41 is located on the heat roller 31 side with respect to the rotation fulcrum 41b, and is provided below the rotation fulcrum 41b of the separating claw 41. Further, a lower end of the outer circumference of the guide roller 42 protrudes downward from the straight line L0 (see, FIG. 5) connecting the nip portion 34 of the fixing portion 30 and the nip portion 18d of the conveying roller pair 18.

[0071] In the second embodiment, the guide roller 44 is located between the rotation fulcrum 41b and the conveying roller pair 18, and below the rotation fulcrum 41b. The rotation center 41e of the guide roller 44 is located on downstream side of the guide roller 42. A lower end of the outer circumference of the guide roller 44 is located above a straight line L2 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d of the conveying roller pair 18. Further, the lower end of the outer circumference of the guide roller 44 is located below the rotation fulcrum 41b of the separating claw 41A, and is located on downstream side of the rotation fulcrum 41b of the separating claw 41A.

[0072] The configuration of the fixing device 50A of the second embodiment is the same as the fixing device 50 of the first embodiment (FIG. 2) except that the separating claw unit 40A has the guide roller 44.

[OPERATION OF FIXING DEVICE]

[0073] FIG. 12 is a schematic view for illustrating a first state of the separating claw unit 40A during the passage of the sheet P through the fixing portion 30.

[0074] The first state shown in FIG. 12 is a state after a leading end of the sheet P has passed the nip portion 34 between the heat roller 31 and the pressure roller 32, and just before the leading end of the sheet P reaches the guide roller 42.

[0075] The leading end of the sheet P having passed the nip portion 34 may move relatively downward, depending on a material of the sheet P or a material of a surface layer of the pressure roller 32. In this case, the leading end of the sheet P passes a vicinity of the pressure roller 32, and is separated from the heat roller 31 by itself. The sheet P is conveyed along a conveying path guide 35 without contacting the separating claw end 41a. Even if the conveyed sheet P contacts the guide roller 42, the separating claw end 41a is kept in contact with the heat roller 31 since the guide roller 42 is forced in upward direction by the sheet P (i.e., the separating claw unit 40A does not rotate).

[0076] FIG. 13 is a schematic view for illustrating a second state of the separating claw unit 40A during the passage of the sheet P through the fixing portion 30.

[0077] The second state shown in FIG. 13 is a state where the leading end of the sheet P contacts the guide roller 44.

[0078] When the leading end of the sheet P (having been conveyed while contacting the guide roller 42 and the conveying path guide 35) contacts the guide roller 44, the sheet P forces the guide roller 44 so that the separating claw unit 40A rotates clockwise about the rotation fulcrum 41b resisting the force of the spring 43. With the rotation of the separation claw unit 40A, the separating claw end 41a moves apart from the heat roller 31.

[0079] In this state, a separating amount "t" between the separating claw end 41a and the heat roller 31 is determined by a position of the separating claw 41A when the separating claw projection 41d on the upper part of the separating claw 41A contacts the stopper 33a of the fixing portion cover 33d. The separating amount "t" is determined so that the separating claw end 41a having reached a lower end of a movable range thereof does not contact the sheet P.

[0080] FIG. 14 is a schematic view showing a third state of the separating claw unit 40A during the passage of the sheet P through the fixing portion 30.

[0081] The third state shown in FIG. 14 is a state after the leading end of the sheet P reaches the conveying roller pair 18. When the leading end of the sheet P reaches the conveying roller pair 18, and when the sheet P proceeds on the straight line L2 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d of the conveying roller pair 18, the force causing the separating claw unit 40A to rotate clockwise (FIG. 14) disappears, since the guide roller 44 is located above the straight line L2 and does not contact the sheet P. Therefore, the separating claw unit 40A rotates to bring the separating claw end 41a in contact with the heat roller 31 due to the biasing force of the spring 43. Thereafter, the sheet P is conveyed by the conveying roller pair 18. While the sheet P is conveyed by the conveying roller pair 18, the separating claw end 41a is kept in contact with the heat roller 31. Further, after a tail end of the sheet P has passed the separating claw unit 40A, the separating claw end 41a is kept in contact with the heat roller 31.

[0082] It is preferable that the lower end of the outer circumference of the guide roller 44 is located above the straight line L2 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d (as the contact area) of the conveying roller pair 18

by an amount ΔS. When the sheet P reaches the conveying roller pair 18, the sheet P is stretched between the nip portion 18d (as the contact area) of the conveying roller pair 18, the guide roller 42, and the nip portion 34 (as the contact area between the heat roller 31 and the pressure roller 32).

[0083] In this state, a tensioning force of the sheet P acts on the separating claw unit 40A via the guide roller 42. Since the lower end of the outer circumference of the guide roller 42 is located above the straight line L2 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d of the conveying roller pair 18, the tensioning force of the stretched sheet P acts on the separating claw unit 40A only via the guide roller 42. Therefore, the tensioning force (i.e., an external force) acts on the guide roller 42 in a direction shown by an arrow X in FIG. 14 so that the separating claw end 41a contacts the heat roller 31.

[0084] Next, positional relationship between the guide roller 42, the rotation fulcrum 41b of the separating claw 41A, and the guide roller 44 will be described.

[0085] FIG. 15 is a schematic view showing the positional relationship between the guide roller 42, the rotation fulcrum 41b of the separating claw 41A, and the guide roller 44.

[0086] In order that the guide roller 44 has a function to guide the sheet P toward the conveying roller pair 18, it is preferable that the guide roller 44 is located so as to contact the straight line L2. However, it is also necessary that the external force (i.e., the tensioning force) is applied to the separating claw unit 40A by the sheet P in a direction in which the separating claw end 41a contacts the heat roller 31 as described above.

[0087] In view of this, the guide roller 42, the rotation fulcrum 41b and the guide roller 44 are arranged in this order along the conveying direction of the sheet P from upstream (i.e., the fixing portion 30 side) to downstream (i.e., conveying roller pair 18 side). Further, a distance m1 between the rotation center 41e of the guide roller 44 and the rotation fulcrum 41b is set to be smaller than a distance m2 between the rotation center 41c of the guide roller 42 and the rotation fulcrum 41b (i.e., $m1 < m2$).

[0088] In this regard, the distance m1 is a distance between the rotation center 41e and the rotation fulcrum 41b, which is projected onto the straight line L2 connecting the lower end of the outer circumference of the guide roller 42 and the nip portion 18d (as the contact area) of the conveying roller pair 18. Similarly, the distance m2 is a distance between the rotation center 41c and the rotation fulcrum 41b, which is projected onto the straight line L2.

[0089] With such a configuration, the external force acting on the guide roller 42 is larger than the external force acting on the guide roller 44. Therefore, the external force acts on the separating claw unit 40A by the sheet P in a direction to cause the separating claw end 41a to contact the heat roller 31.

[Advantage]

[0090] The second embodiment of the present invention provides the following advantage in addition to the advantages of the first embodiment.

[0091] The guide roller 42 and the guide roller 44 are provided at positions different from the rotation fulcrum 41b of the separating claw 41A, and the spring 43 generates the relatively small biasing force and allows the rotation of the separating claw unit 40 when the guide roller 42 is forced by the leading end of the sheet P. With such a configuration, the separating claw end 41a can separates the sheet P from the heat roller 31, even when the sheet P does not wind around the heat roller 31, but the leading end of the sheet P moves relatively downward. As a result, the occurrence of jam of the sheet P can be prevented.

MODIFICATIONS.

[0092] The above described embodiments can be modified as follows.

(A) In the first and second embodiment, descriptions have been made of the page printer as an example of the image forming apparatus. However, the present invention is not limited to such an example, but is applicable to, for example, a facsimile machine, a copier, an MTF (Multifunction Printer/Product/Peripheral) and the like.

(B) In the first and second embodiments, descriptions have been made of the fixing device 50 (50A) in the image forming apparatus 10 as an example of the separating device. However, the present invention is not limited to such an example, but is applicable to, for example, a receipt issuing device or the like used in an automatic transaction machine such as an automatic-teller machine (ATM).

(C) In the first and second embodiments, descriptions have been made of the fixing portion 30 as an example of the carrying-out portion that supplies the sheet P to the separating claw unit 40. However, the present invention is not limited to such an example, but is applicable to any carrying-out portion that carries out the medium.

(D) In the first and second embodiments, descriptions have been made of the conveying belt unit 17h (as the medium operating portion) and the fixing device 50 (50A) in the image forming apparatus 10 as an example of the medium conveying device. However, the present invention is not limited to such an example, but is applicable to, for example, a receipt issuing device or the like used in an automatic transaction machine such as an automatic-teller machine (ATM).

[0093] While the preferred embodiments of the present invention have been illustrated in detail, it should be ap-

parent that modifications and improvements may be made to the invention without departing from the scope of the invention as described in the following claims.

Claims

1. A separating device (50A) comprising:

a carrying-out portion (30) for carrying-out a medium (P);
a conveying portion (18) for conveying said medium (P) carried out by said carrying-out portion (30), and
a separating portion (40A) provided between said carrying-out portion (30) and said conveying portion (18) so as to be rotatable about a rotation fulcrum (41b), said separating portion (40A) having an end portion (41a) which is contactable and separable with said carrying-out portion (30), said end portion (41a) of said separating portion (40) contacting said carrying-out portion (30) to thereby separate said medium (P) from said carrying-out portion (30), and
wherein said separating portion (40A) comprises:

a first guiding portion (42) rotatably provided for guiding said medium (P) separated from said carrying-out portion (30) to said conveying portion (18); and
a second guiding portion (44) rotatably provided for guiding said medium (P) separated from said carrying-out portion (30) to said conveying portion (18);
wherein said first guiding portion (42) has a rotation center (41c) which is located on said carrying-out portion (30) side with respect to said rotation fulcrum (41b) of said separating portion (40A), and
wherein, when a straight line (Lo) is defined by connecting a contact area (34) of said carrying-out portion (30) and a contact area (18d) of said conveying portion (18), said rotation center (41c) of said first guiding portion (42) is located on said straight line (Lo) side with respect to said rotation fulcrum (41b) of said separating portion (40A);
wherein said second guiding portion (44) has a rotation centre (41e) which is located on said conveying portion (18) side with respect to said rotation fulcrum (41b), and is located on said straight line (Lo) side with respect to said rotation fulcrum (41b) of said separating portion (40A);
characterised in that
a distance (m2) between said rotation centre (41c) of said first guiding portion (42) and said rotation fulcrum (41b) is larger than a distance (mi) between said rotation centre (41e) of said second guiding portion (44) and said rotation fulcrum (41b) ;
wherein said distances (ml,m2) are projected onto a straight line (L2) defined by connecting the lower end of the outer circumference of said first guiding portion (42) and the contact area (18d) of said conveying portion (18).

2. The separating device (50A) according to claim 1, wherein said carrying-out portion (30) includes a fixing portion (30) that fixes a developer to a medium (P) and carries out said medium (P) therefrom.

3. The separating device (50A) according to claim 1 or 2,
wherein a biasing portion (43) is provided so as to bias said separating portion (40) in a direction in which said separating portion (40) contacts said carrying-out portion (30),
wherein said separating portion (40) comprises a separating claw (41) biased by said biasing portion (43) to contact said carrying-out portion (30) so as to separate said medium (P) from said carrying-out portion (30);
wherein said first guiding portion (42) is rotatably provided on said separating claw (41) so as to protrude from said straight line (Lo) connecting said contact area (34) of said carrying-out portion (30) and said contact area (18d) of said conveying portion (18), and
wherein said rotation fulcrum (41b) is provided on downstream side of said first guiding portion (42) in a conveying direction of said medium (P), said rotation fulcrum (41b) supporting said separating claw (41) so that said separating claw (41) is movable to contact with or separate from said carrying-out portion (30).

4. The separating device (50A) according to any one of claims 1 to 3,
wherein said second guiding portion (44) is located on downstream side of said first guiding portion (42) in said conveying direction of said medium (P), and is located upstream side of said conveying portion (18) in said conveying direction of said medium (P).

5. The separating device (50A) according to claim 3, wherein said first guiding portion (42) is rotatable about said rotation center (41c) provided on said separating claw (41), said rotation center (41c) being located between said rotation fulcrum (41b) and said carrying-out portion (30) and below said rotation fulcrum (41b) in a vertical direction.

6. The separating device (50A) according to any one

of claims 1 to 5,
wherein said second guiding portion (44) is located between said rotation fulcrum (41b) and said conveying portion (18) and below said rotation fulcrum (41b) in a vertical direction, said second guiding portion (44) being located so that a lower end of an outer circumference thereof contacts a second straight line (L2) connecting a lower end of an outer circumference of said first guiding portion (42) and said contact area (18d) of said conveying portion (18).

7. The separating device (50A) according to any one of claims 1 to 5,
wherein said second guiding portion (44) is located between said rotation fulcrum (41b) and said conveying portion (18) and below said rotation fulcrum (41b) in a vertical direction, said second guiding portion (44) being located above a second straight line (L2) connecting a lower end of an outer circumference of said first guiding portion (42) and said contact area (18d) of said conveying portion (18), and
wherein said first guiding portion (42) and said second guiding portion (44) are located so that a distance (m2) between a rotation center (41c) of said first guiding portion (42) and said rotation fulcrum (41b) is larger than a distance (m1) between a rotation center (41e) of said second guiding portion (44) and said rotation fulcrum (41b).

8. The separating device (50A) according to any one of claims 1 to 7, wherein said first guiding portion (42) comprises a roller.

9. The separating device (50A) according to any one of claims 1 to 7, wherein said first guiding portion (42) and said second guiding portion (44) respectively comprise rollers.

10. A medium conveying device comprising:

said separating device (50A) according to any one of claims 1 to 9, and
a medium operating portion (17h) that performs a predetermined operation on said medium (P) and supplies said medium (P) to said separating device (50A).

11. An image forming apparatus (10) comprising:

said separating device (50A) according to any one of claims 1 to 9, and an image forming portion (17) that forms a developer image using a developer, transfers said developer image to said medium (P), and supplies said medium (P) to said separating device (50, 50A).

12. The image forming apparatus (10) according to claim 11, wherein said image forming portion (17) comprises:

a developer storage portion (17a) that stores said developer;
an image bearing body (17c) that bears a latent image;
an exposure unit (17b) that forms said latent image on said image bearing body (17c) to form said developer image, and
a transferring portion (17d) that transfers said developer image from said image bearing body (17c) to said medium (P), and supplies said medium (P) to said separating device (50A).

13. A fixing device comprising said separating device (50A) according to claim 2, said fixing portion (30) comprising:

a heat roller (31) that heats said medium (P) when said medium (P) passes said heat roller (31), and
a pressure roller (32) that applies a pressure to said medium (P) between said heat roller (31) and said pressure roller (32).

Patentansprüche

1. Trennvorrichtung (50A), umfassend:

einen Ausgabebereich (30) zum Ausgeben eines Mediums (P);
einen Förderbereich (18) zum Fördern des vom Ausgabebereich (30) ausgegebenen Mediums (P) und
einen Trennbereich (40A), der zwischen dem Ausgabebereich (30) und dem Förderbereich (18) derart vorgesehen ist, dass er um ein Drehgelenk (41 b) drehbar ist, wobei der Trennbereich (40A) einen Endbereich (41 a) aufweist, der mit dem Ausgabebereich (30) kontaktierbar und trennbar ist, wobei der Endbereich (41 a) des Trennbereichs (40) den Ausgabebereichen (30) kontaktiert, um hierdurch das Medium (P) von den Ausgabebereichen (30) zu trennen und wobei der Trennbereich (40A) umfasst:

einen ersten Führungsbereich (42), der drehbar vorgesehen ist, um das von dem Ausgabebereich (30) getrennte Medium (P) zu dem Förderbereich (18) zu führen; und
einen zweiten Führungsbereich (44), der drehbar vorgesehen ist, um das von dem Ausgabebereich (30) getrennte Medium (P) zu dem Förderbereich (18) zu führen;
wobei der erste Führungsbereich (42) ein Drehzentrum (41 c) hat, welches bezogen auf das Drehgelenk (41 b) des Trennbe-

reichs (40A) auf der Seite des Ausgabebereichs (30) lokalisiert ist, und
wobei dann, wenn eine gerade Linie (Lo) definiert wird, in dem man eine Kontaktfläche (34) des Ausgabebereichs (30) und eine Kontaktfläche (18d) des Förderbereichs (18) miteinander verbindet, das Drehzentrum (41 c) des ersten Führungsbereichs (42) bezogen auf das Drehgelenk (41 b) des Trennbereichs (40A) auf der Seite der geraden Linie (Lo) lokalisiert ist;
wobei der zweite Führungsbereich (44) ein Drehzentrum (41 e) aufweist, welches bezogen auf das Drehgelenk (41 b) auf der Seite des Förderbereichs (18) lokalisiert ist, und welches bezogen auf das Drehgelenk (41 b) des Trennbereichs (40A) auf der Seite der geraden Linie (Lo) lokalisiert ist;
dadurch gekennzeichnet, dass
ein Abstand (m2) zwischen dem Drehzentrum (41 c) des ersten Führungsbereichs (42) und dem Drehgelenk (41 b) größer ist als ein Abstand (m1) zwischen dem Drehzentrum (41 e) des zweiten Führungsbereichs (44) und dem Drehgelenk (41 b);
wobei die Abstände (m1, m2) auf eine gerade Linie (L2) projiziert sind, die definiert ist, indem man das untere Ende des äußeren Umfangs des ersten Führungsbereichs (42) und die Kontaktfläche (18d) des Förderbereichs (18) miteinander verbindet.

2. Trennvorrichtung (50A) nach Anspruch 1, wobei der Ausgabebereich (30) einen Fixierbereich (30) enthält, der einen Entwickler auf einem Medium (P) fixiert und das Medium (P) von dort ausgibt.

3. Trennvorrichtung (50A) nach Anspruch 1 oder 2,
wobei ein Beaufschlagungsbereich (43) derart vorgesehen ist, dass der Trennbereich (40) in einer Richtung beaufschlagt wird, in der der Trennbereich (40) den Ausgabebereich (30) kontaktiert,
wobei der Trennbereich (40) eine Trennklaue (41) umfasst, die von dem Beaufschlagungsbereich (43) beaufschlagt wird, um den Ausgabebereich (30) derart zu kontaktieren, dass das Medium (P) von dem Ausgabebereich (30) getrennt wird;
wobei der erste Führungsbereich (42) an der Trennklaue (41) derart drehbar vorgesehen ist, dass er von der geraden Linie (Lo) vorsteht, die die Kontaktfläche (34) des Ausgabebereichs (30) und die Kontaktfläche (18d) des Förderbereichs (18) miteinander verbindet, und
wobei das Drehgelenk (41 b) auf einer stromabwärtigen Seite des ersten Führungsbereichs (42) in einer Förderrichtung des Mediums (P) vorgesehen ist, wobei das Drehgelenk (41 b) die Trennklaue (41) derart stützt, dass die Trennklaue (41) zum Kontaktieren des Ausgabebereichs (30) oder zur Trennung hiervon bewegbar ist.

4. Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 3,
wobei der zweite Führungsbereich (44) an einer stromabwärtigen Seite des ersten Führungsbereichs (42) in der Förderrichtung des Mediums (P) lokalisiert ist, und an einer stromaufwärtigen Seite des Förderbereichs (18) in der Förderrichtung des Mediums (P) lokalisiert ist.

5. Trennvorrichtung (50A) nach Anspruch 3, wobei der erste Führungsbereich (42) um das Drehzentrum (41 c) drehbar ist, welches an der Trennklaue (41) vorgesehen ist, wobei das Drehzentrum (41 c) zwischen dem Drehgelenk (41 b) und dem Ausgabebereich (30) und unter dem Drehgelenk (41 b) in einer vertikalen Richtung lokalisiert ist.

6. Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 5,
wobei der zweite Führungsbereich (44) zwischen dem Drehgelenk (41 b) und dem Förderbereich (18) und unter dem Drehgelenk (41 b) in einer vertikalen Richtung lokalisiert ist, wobei der zweite Führungsbereich (44) derart lokalisiert ist, dass ein unteres Ende eines äußeren Umfangs davon eine zweite gerade Linie (L2) kontaktiert, die ein unteres Ende eines äußeren Umfangs des ersten Führungsbereichs (42) und die Kontaktfläche (18d) des Förderbereichs (18) miteinander verbindet.

7. Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 5,
wobei der zweite Führungsbereich (44) zwischen dem Drehgelenk (41 b) und dem Förderbereich (18) und unter dem Drehgelenk (41 b) in einer vertikalen Richtung lokalisiert ist, wobei der zweite Führungsbereich (44) über einer zweiten geraden Linie (L2) lokalisiert ist, die ein unteres Ende eines äußeren Umfangs des ersten Führungsbereichs (42) und die Kontaktfläche (18d) des Förderbereichs (18) miteinander verbindet, und
wobei der erste Führungsbereich (42) und der zweite Führungsbereich (44) derart lokalisiert sind, dass ein Abstand (m2) zwischen einem Drehzentrum (41 c) des ersten Führungsbereichs (42) und dem Drehgelenk (41 b) größer ist als ein Abstand (m1) zwischen einem Drehzentrum (41 e) des zweiten Führungsbereichs (44) und dem Drehgelenk (41 b).

8. Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 7, wobei der erste Führungsbereich (42) eine Rolle umfasst.

9. Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 7, wobei der erste Führungsbereich (42) und

der zweite Führungsbereich (44) jeweils Rollen umfassen.

10. Medienfördervorrichtung, umfassend:

die Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 9 und
einen Medienbearbeitungsbereich (17h), der eine vorbestimmte Bearbeitung an dem Medium (P) ausführt und das Medium (P) an die Trennvorrichtung (50A) zuführt.

11. Bilderzeugungsgerät (10) umfassend:

die Trennvorrichtung (50A) nach einem der Ansprüche 1 bis 9, und
einen Bilderzeugungsbereich (17), der ein Entwicklerbild unter Verwendung eines Entwicklers erzeugt, das Entwicklerbild auf das Medium (P) transferiert und das Medium (P) an die Trennvorrichtung (50, 50A) zuführt.

12. Bilderzeugungsgerät (10) nach Anspruch 11, wobei der Bilderzeugungsbereich (17) umfasst:

einen Entwicklerspeicherbereich (17a), der den Entwickler speichert;
einen Bildträgerkörper (17c), der ein latentes Bild trägt;
eine Belichtungseinheit (17b), die das latente Bild auf dem Bildträgerkörper (17c) erzeugt, um das Entwicklerbild zu erzeugen, und
einen Transferbereich (17d), der das Entwicklerbild von dem Bildträgerkörper (17c) auf das Medium (P) transferiert und das Medium (P) an die Trennvorrichtung (50A) zuführt.

13. Fixiervorrichtung, umfassend die Trennvorrichtung (50A) nach Anspruch 2, wobei der Fixierbereich (30) umfasst:

eine Heizrolle (31), die das Medium (P) heizt, wenn das Medium (P) die Heizrolle (31) passiert, und
eine Druckrolle (32), die einen Druck auf das Medium (P) zwischen der Heizrolle (31) und der Druckrolle (32) ausübt.

Revendications

1. Dispositif de séparation (50A) comprenant :

une partie de soutien (30) pour porter un support (P) ;
une partie de transport (18) pour transporter ledit support (P) porté par ladite partie de soutien (30), et
une partie de séparation (40A) prévue entre ladite partie de soutien (30) et ladite partie de transport (18) de manière à pouvoir tourner autour d'un pivot de rotation (41b), ladite partie de séparation (40A) ayant une partie d'extrémité (41a) qui peut entrer en contact avec et se séparer de ladite partie de soutien (30), ladite partie d'extrémité (41a) de ladite partie de séparation (40) entre en contact avec ladite partie de soutien (30) pour séparer ainsi ledit support (P) de ladite partie de soutien (30), et
dans lequel ladite partie de séparation (40A) comprend :

une première partie de guidage (42) prévue de manière rotative pour guider ledit support (P) séparé de ladite partie de soutien (30) vers ladite partie de transport (18) ; et
une deuxième partie de guidage (44) prévue de manière rotative pour guider ledit support (P) séparé de ladite partie de soutien (30) vers ladite partie de transport (18) ;
dans lequel ladite première partie de guidage (42) a un centre de rotation (41c) qui est situé sur le côté de ladite partie de soutien (30) par rapport audit pivot de rotation (41b) de ladite partie de séparation (40A), et
dans lequel, lorsqu'une ligne droite (Lo) est définie en reliant une zone de contact (34) de ladite partie de soutien (30) et une zone de contact (18d) de ladite partie de transport (18), ledit centre de rotation (41c) de ladite première partie de guidage (42) est situé sur le côté de ladite ligne droite (Lo) par rapport audit pivot de rotation (41b) de ladite partie de séparation (40A) ;
dans lequel ladite deuxième partie de guidage (44) a un centre de rotation (41e) qui est situé sur le côté de ladite partie de transport (18) par rapport audit pivot de rotation (41b), et est situé sur le côté de ladite ligne droite (Lo) par rapport audit pivot de rotation (41b) de ladite partie de séparation (40A) ;
caractérisé en ce que
une distance (m2) entre ledit centre de rotation (41c) de ladite première partie de guidage (42) et ledit pivot de rotation (41b) est supérieure à une distance (m1) entre ledit centre de rotation (41e) de ladite deuxième partie de guidage (44) et ledit pivot de rotation (41b) ;
dans lequel lesdites distances (m1, m2) sont projetées sur une ligne droite (L2) définie en reliant l'extrémité inférieure de la circonférence extérieure de ladite première partie de guidage (42) et la zone de contact (18d) de ladite partie de transport (18).

2. Dispositif de séparation (50A) selon la revendication 1, dans lequel ladite partie de soutien (30) comporte une partie de fixation (30) qui fixe un révélateur sur un support (P) et porte ledit support (P) à partir de celle-ci.

3. Dispositif de séparation (50A) selon la revendication 1 ou 2,
dans lequel une partie de sollicitation (43) est prévue de manière à solliciter ladite partie de séparation (40) dans une direction dans laquelle ladite partie de séparation (40) entre en contact avec ladite partie de soutien (30),
dans lequel ladite partie de séparation (40) comprend une griffe de séparation (41) sollicitée par ladite partie de sollicitation (43) pour entrer en contact avec ladite partie de soutien (30) de manière à séparer ledit support (P) de ladite partie de soutien (30);
dans lequel ladite première partie de guidage (42) est prévue de manière rotative sur ladite griffe de séparation (41) de manière à faire saillie à partir de ladite ligne droite (Lo) reliant ladite zone de contact (34) de ladite partie de soutien (30) et ladite zone de contact (18d) de ladite partie de transport (18), et
dans lequel ledit pivot de rotation (41b) est prévu sur le côté aval de ladite première partie de guidage (42) dans une direction de transport dudit support (P), ledit pivot de rotation (41b) supportant ladite griffe de séparation (41) de sorte que ladite griffe de séparation (41) soit mobile pour entrer en contact avec ladite partie de soutien ou se séparer de celle-ci (30).

4. Dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 3,
dans lequel ladite deuxième partie de guidage (44) est située sur le côté aval de ladite première partie de guidage (42) dans une direction de transport dudit support (P), et est située sur le côté amont de ladite partie de transport (18) dans ladite direction de transport dudit support (P).

5. Dispositif de séparation (50A) selon la revendication 3, dans lequel ladite première partie de guidage (42) peut tourner autour dudit centre de rotation (41c) prévu sur ladite griffe de séparation (41), ledit centre de rotation (41c) étant situé entre ledit pivot de rotation (41b) et ladite partie de soutien (30) et en dessous dudit pivot de rotation (41b) dans une direction verticale.

6. Dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 5,
dans lequel ladite deuxième partie de guidage (44) est située entre ledit pivot de rotation (41b) et ladite partie de transport (18) et en dessous dudit pivot de rotation (41b) dans une direction verticale, ladite deuxième partie de guidage (44) étant située de sorte qu'une extrémité inférieure d'une circonférence extérieure de celle-ci entre en contact avec une deuxième ligne droite (L2) reliant une extrémité inférieure d'une circonférence extérieure de ladite première partie de guidage (42) et ladite zone de contact (18d) de ladite partie de transport (18).

7. Dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 5,
dans lequel ladite deuxième partie de guidage (44) est située entre ledit pivot de rotation (41b) et ladite partie de transport (18) et en dessous dudit pivot de rotation (41b) dans une direction verticale, ladite deuxième partie de guidage (44) étant située au-dessus d'une deuxième ligne droite (L2) reliant une extrémité inférieure d'une circonférence extérieure de ladite première partie de guidage (42) et ladite zone de contact (18d) de ladite partie de transport (18), et dans lequel ladite première partie de guidage (42) et ladite deuxième partie de guidage (44) sont situées de sorte qu'une distance (m2) entre un centre de rotation (41c) de ladite première partie de guidage (42) et ledit pivot de rotation (41b) soit supérieure à une distance (m1) entre un centre de rotation (41e) de ladite deuxième partie de guidage (44) et ledit pivot de rotation (41b).

8. Dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 7, dans lequel ladite première partie de guidage (42) comprend un rouleau.

9. Dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 7, dans lequel ladite première partie de guidage (42) et ladite deuxième partie de guidage (44) comprennent respectivement des rouleaux.

10. Dispositif de transport de support comprenant :

ledit dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 9, et
une partie d'actionnement de support (17h) qui effectue une opération prédéterminée sur ledit support (P) et fournit ledit support (P) audit dispositif (50A) de séparation.

11. Appareil de formation d'image (10) comprenant :

ledit dispositif de séparation (50A) selon l'une quelconque des revendications 1 à 9, et une partie de formation d'image (17) qui forme une image de révélateur en utilisant un révélateur, transfère ladite image de révélateur sur ledit support (P), et fournit ledit support (P) audit dispositif de séparation (50, 50A).

12. Appareil de formation d'image (10) selon la revendication 11, dans lequel ladite partie de formation d'image (17) comprend :

une partie de stockage de révélateur (17a) qui stocke ledit révélateur ;
un corps porteur d'image (17c) qui porte une image latente ;
une unité d'exposition (17b) qui forme ladite image latente sur ledit corps porteur d'image (17c) pour former ladite image de révélateur, et
une partie de transfert (17d) qui transfère ladite image de révélateur depuis ledit corps porteur d'image (17c) vers ledit support (P), et fournit ledit support (P) audit dispositif de séparation (50A).

13. Dispositif de fixation comprenant ledit dispositif de séparation (50A) selon la revendication 2, ladite partie de fixation (30) comprenant :

un rouleau chauffant (31) qui chauffe ledit support (P) lorsque ledit support (P) passe par ledit rouleau chauffant (31), et
un rouleau presseur (32) qui applique une pression audit support (P) entre ledit rouleau chauffant (31) et ledit rouleau presseur (32).

FIG.1

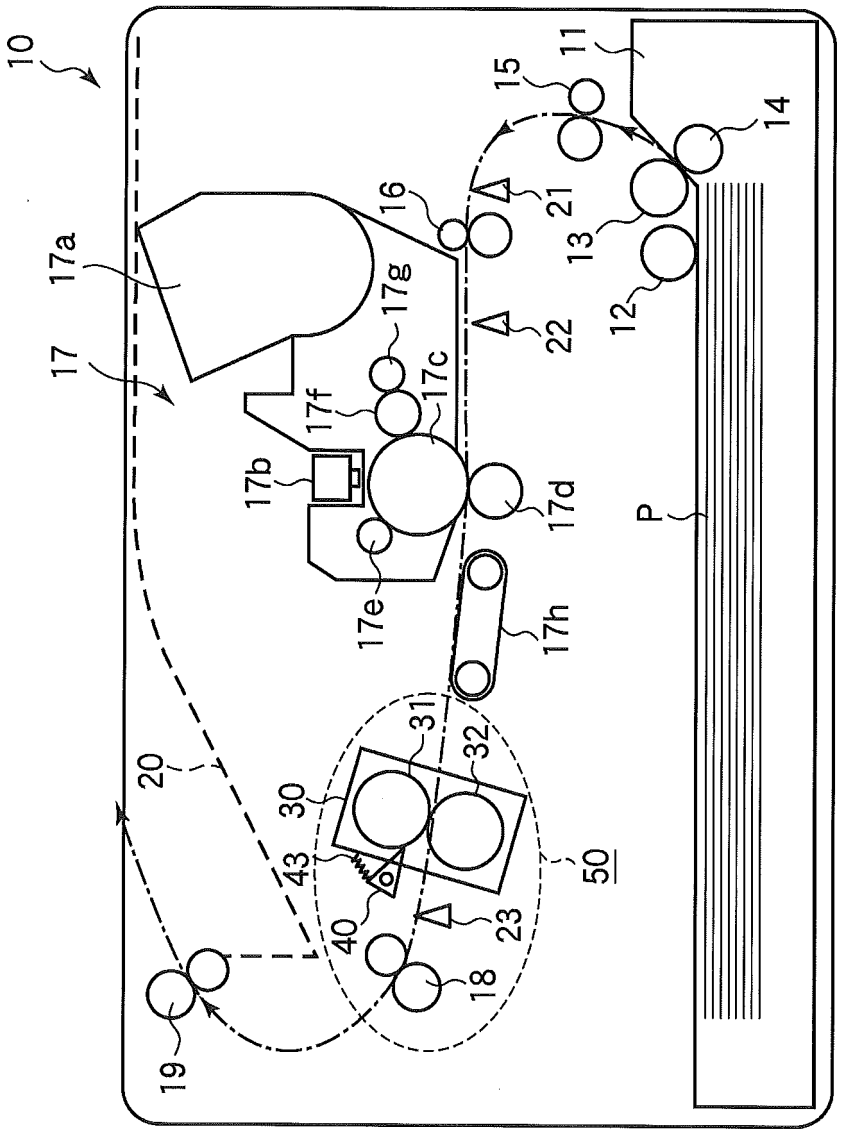

10
11
15
14
16
21
13
17a
17g
22
12
17
17c
17f
17b
17d
P
17e
17h
31
32
20
30
43
50
40
23
18
19

FIG.2

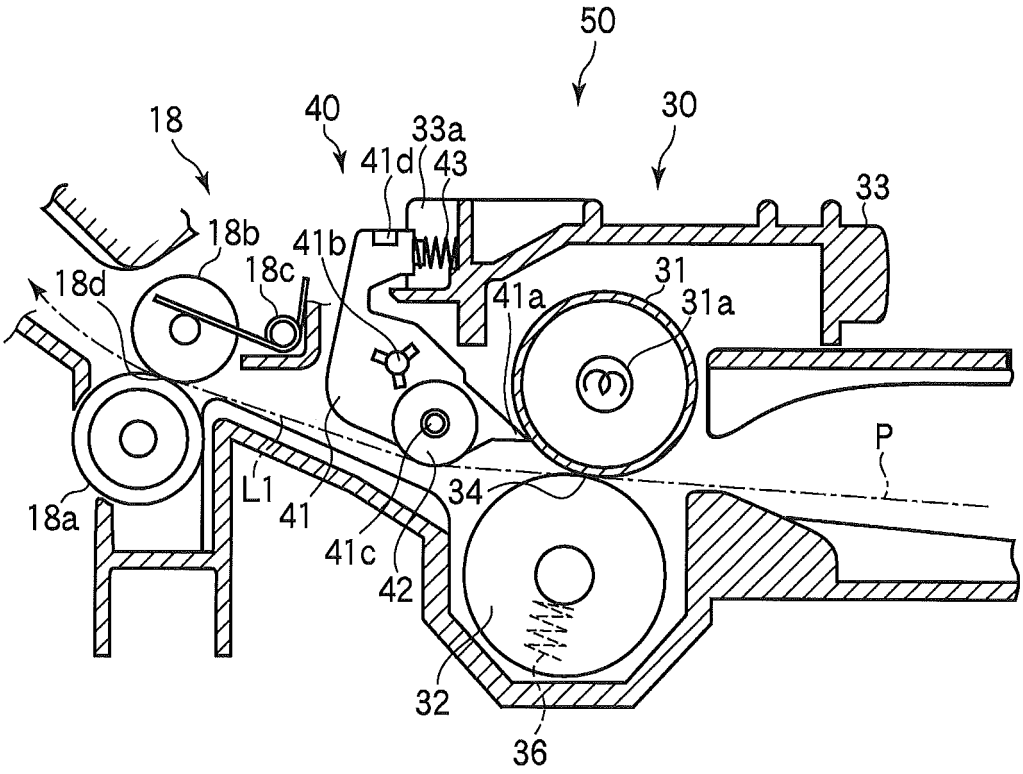

50
18
40
33a
41d
43
30
33
18b
41b
18c
18d
31
31a
41a
P
L1
41
34
18a
41c
42
32
36

FIG.3

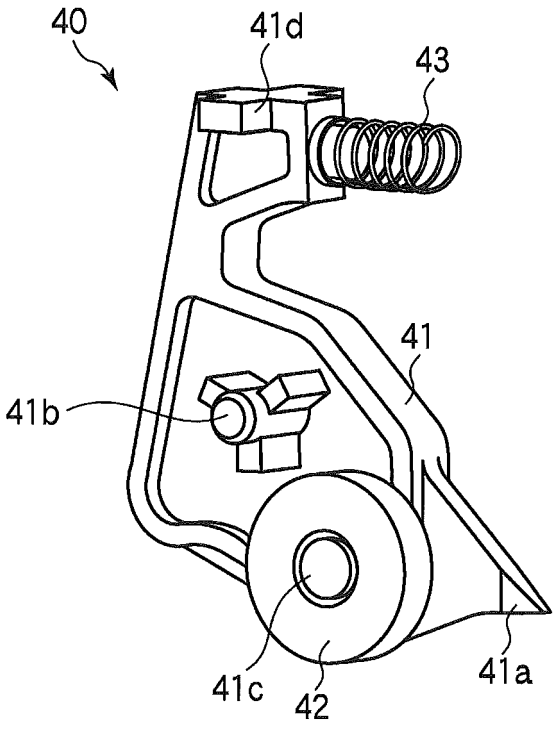


FIG.4

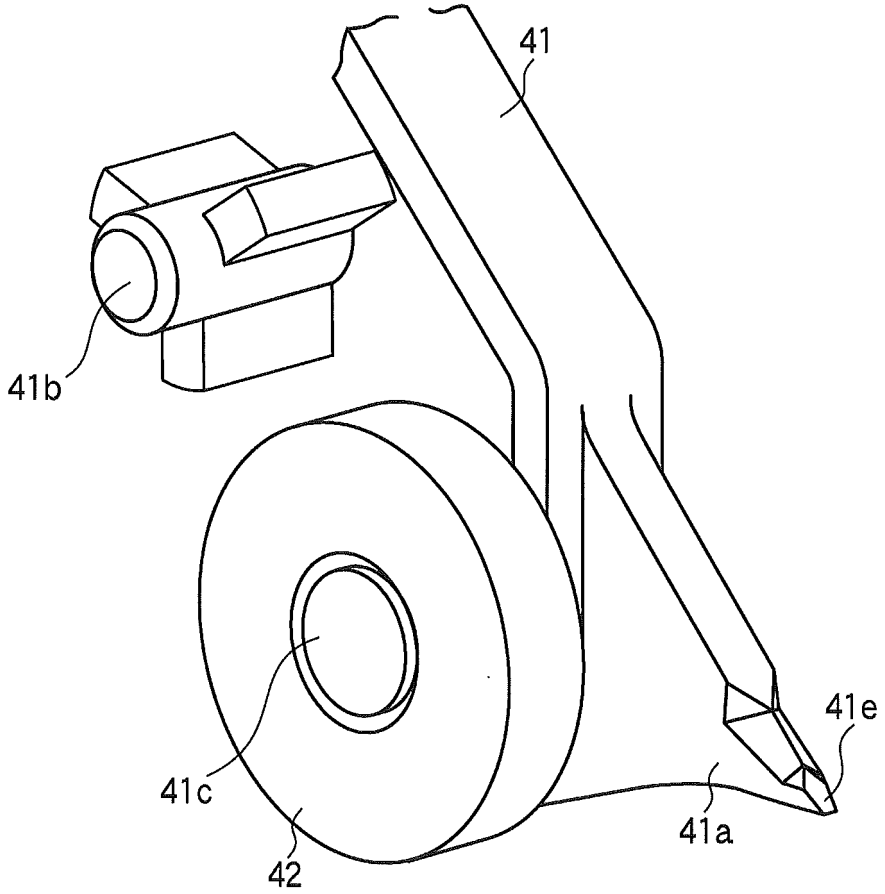


FIG.5

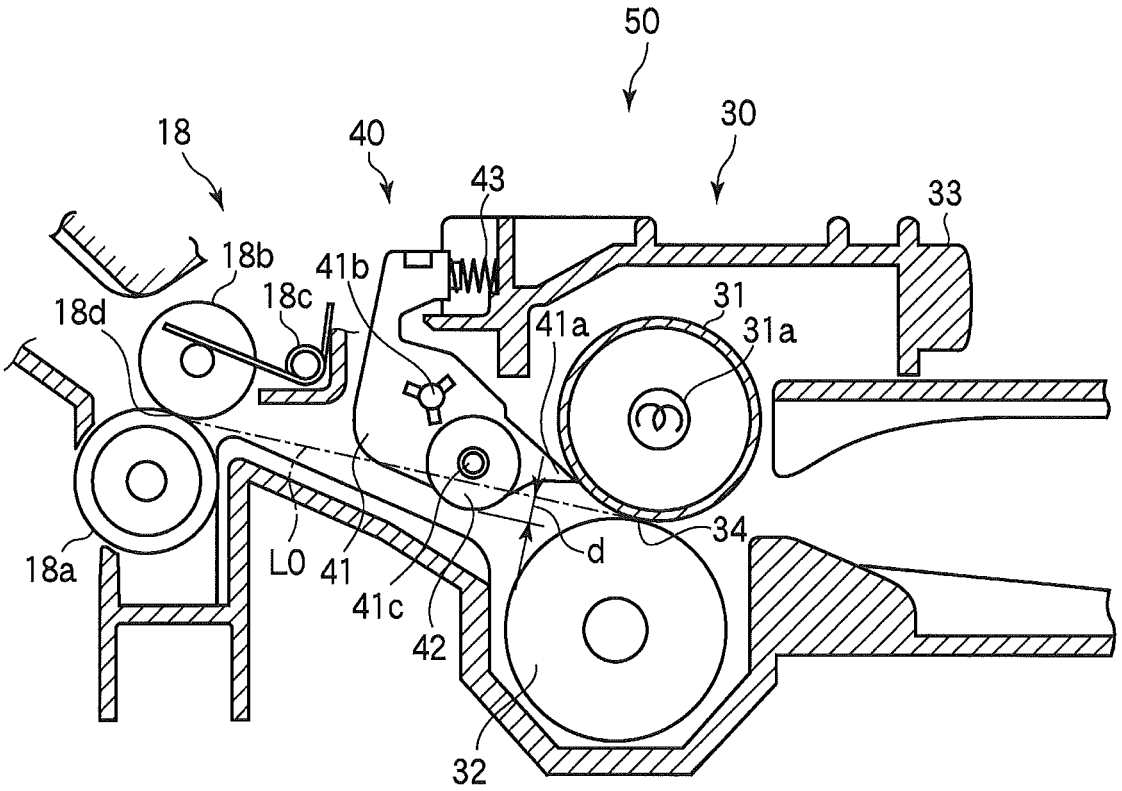


FIG.6

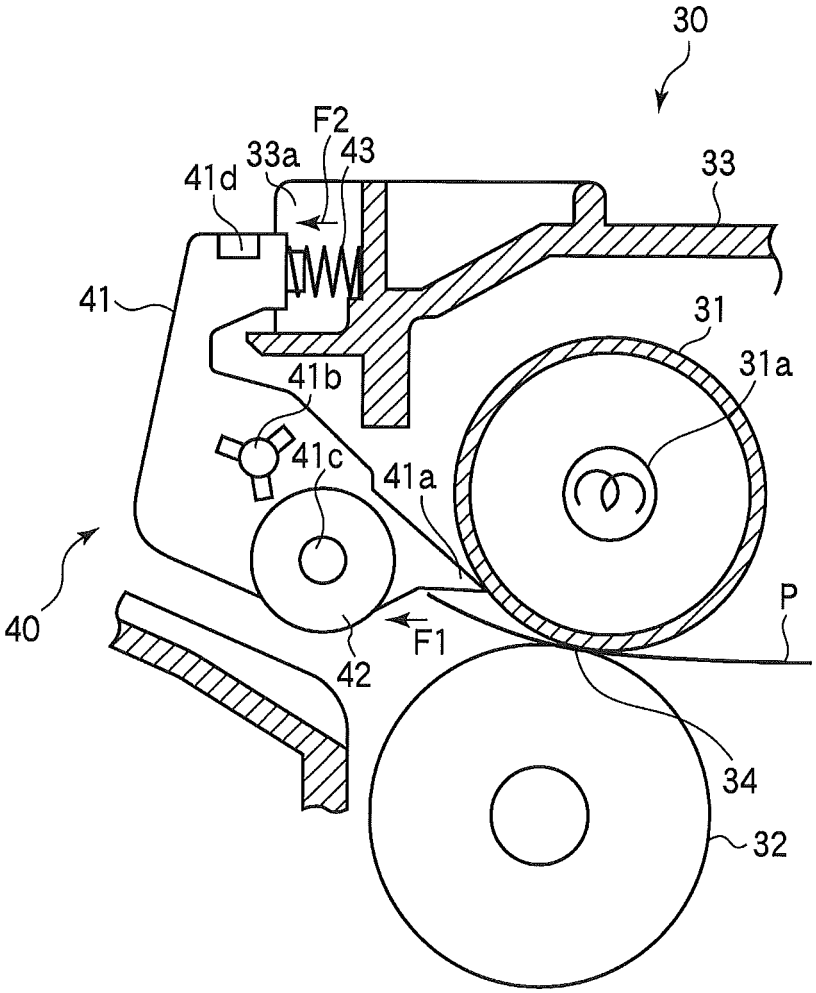


FIG.7

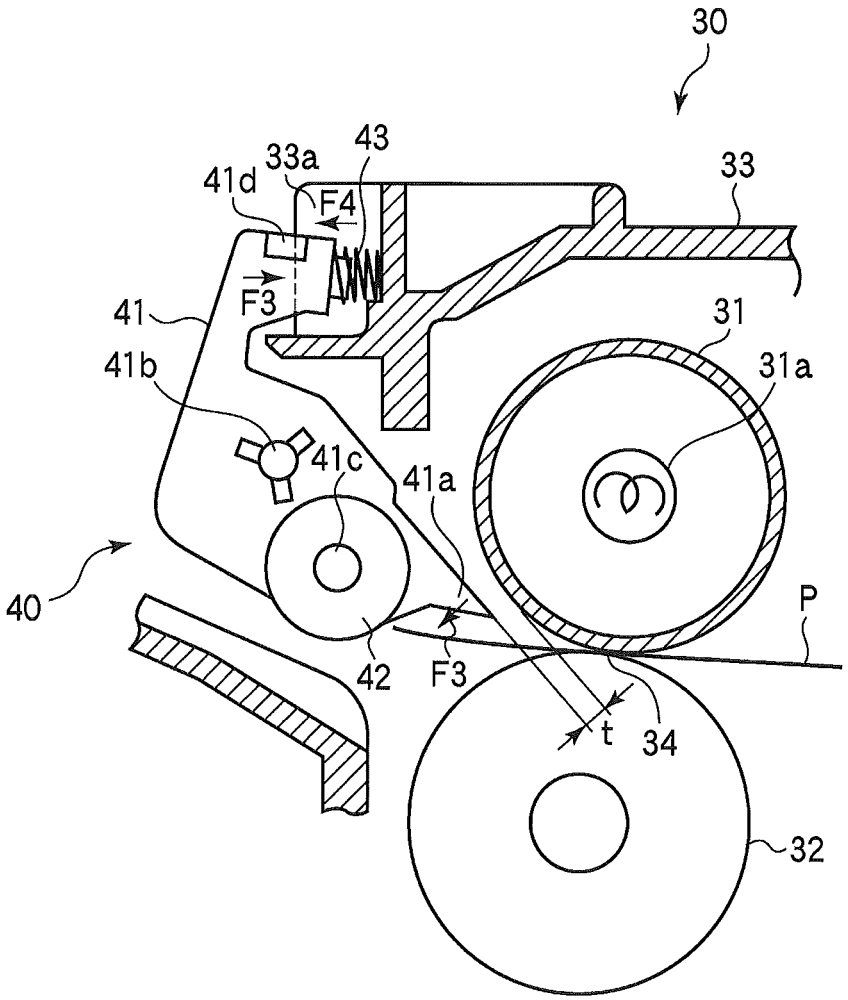


FIG.8

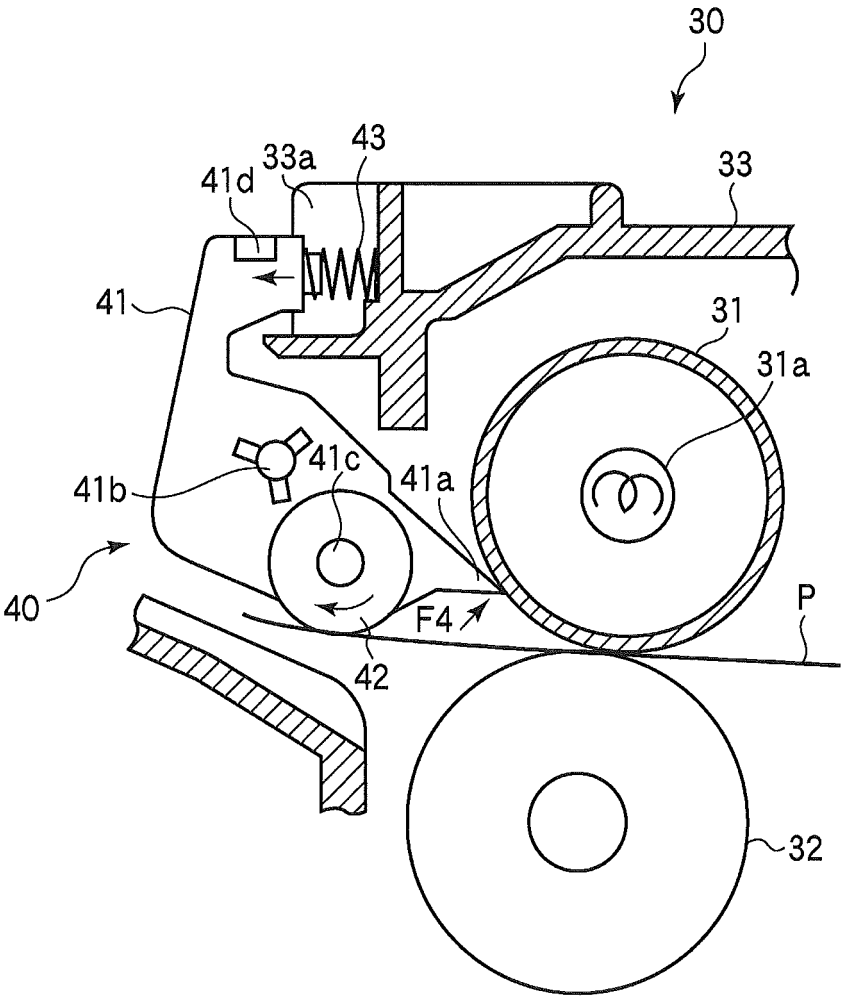


FIG.9

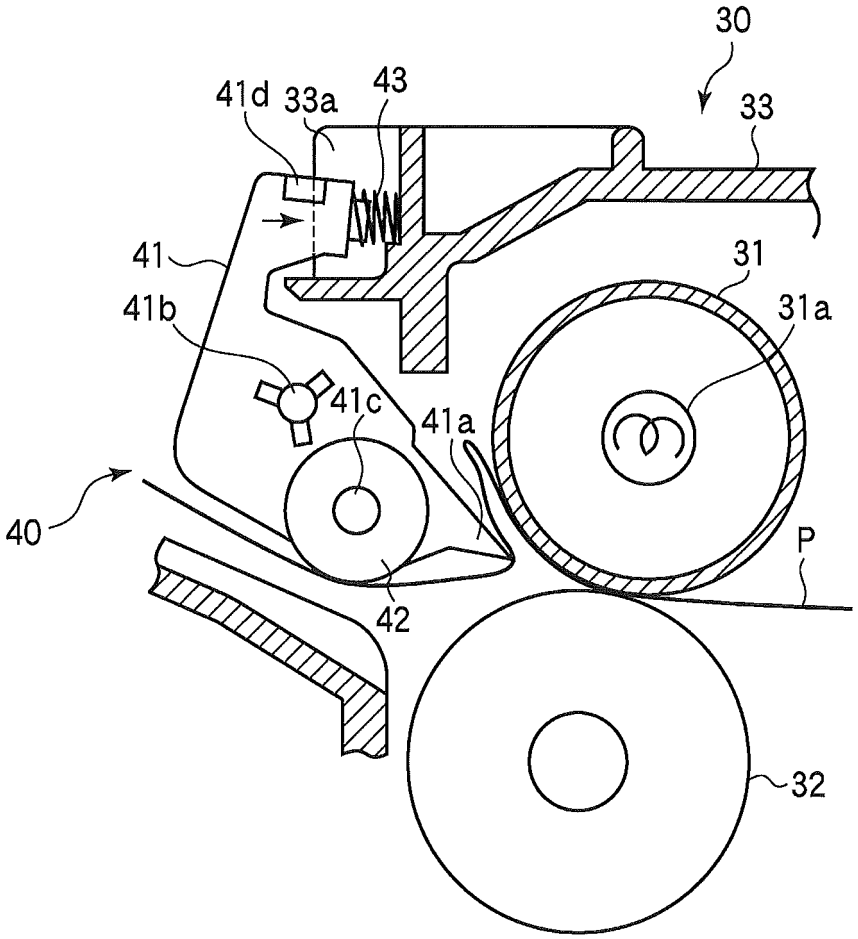


FIG.10

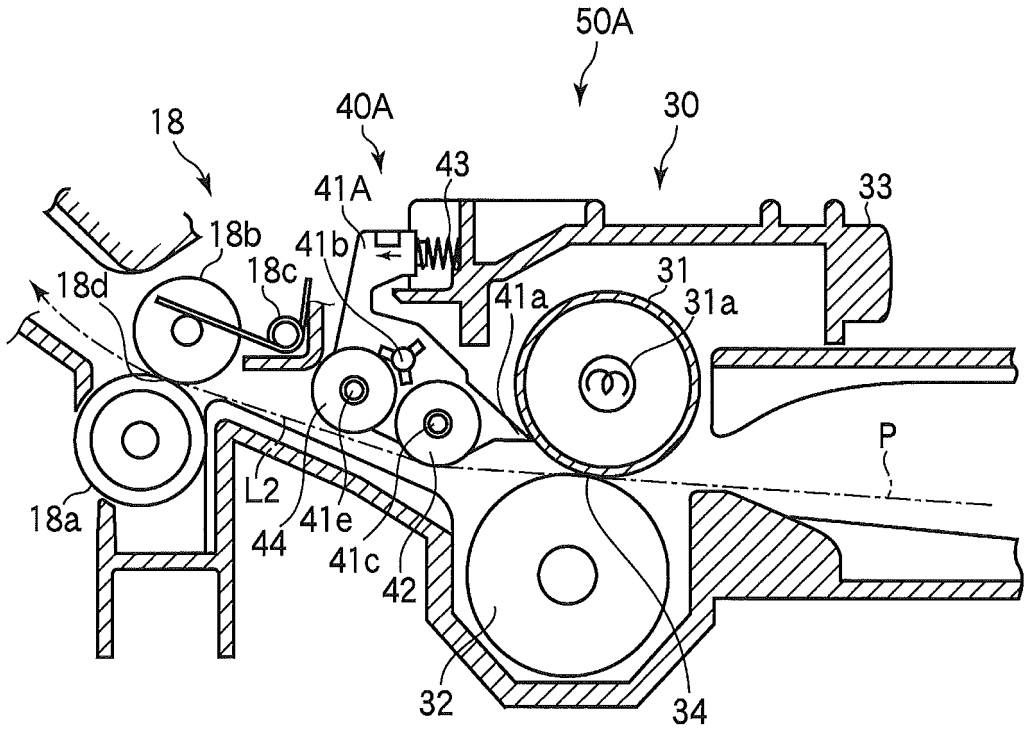

50A
18
40A
30
41A
43
33
18b
41b
18c
31
18d
41a
31a
P
L2
18a
44
41e
41c
42
32
34

FIG.11

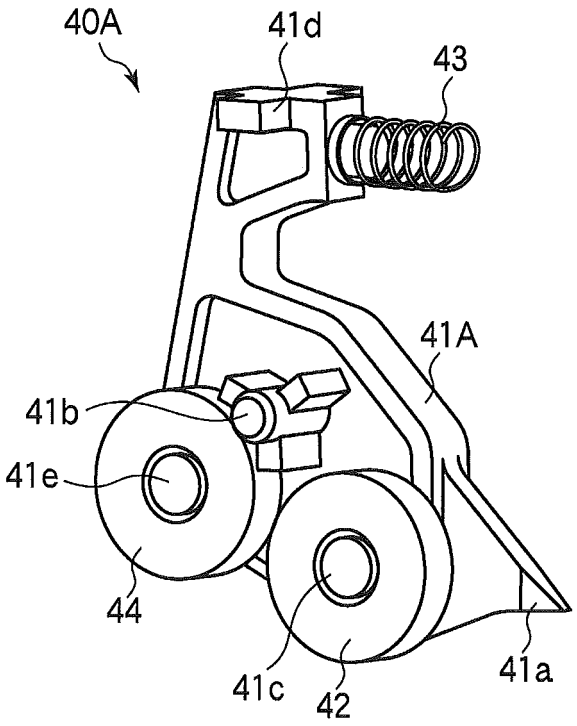


FIG.12

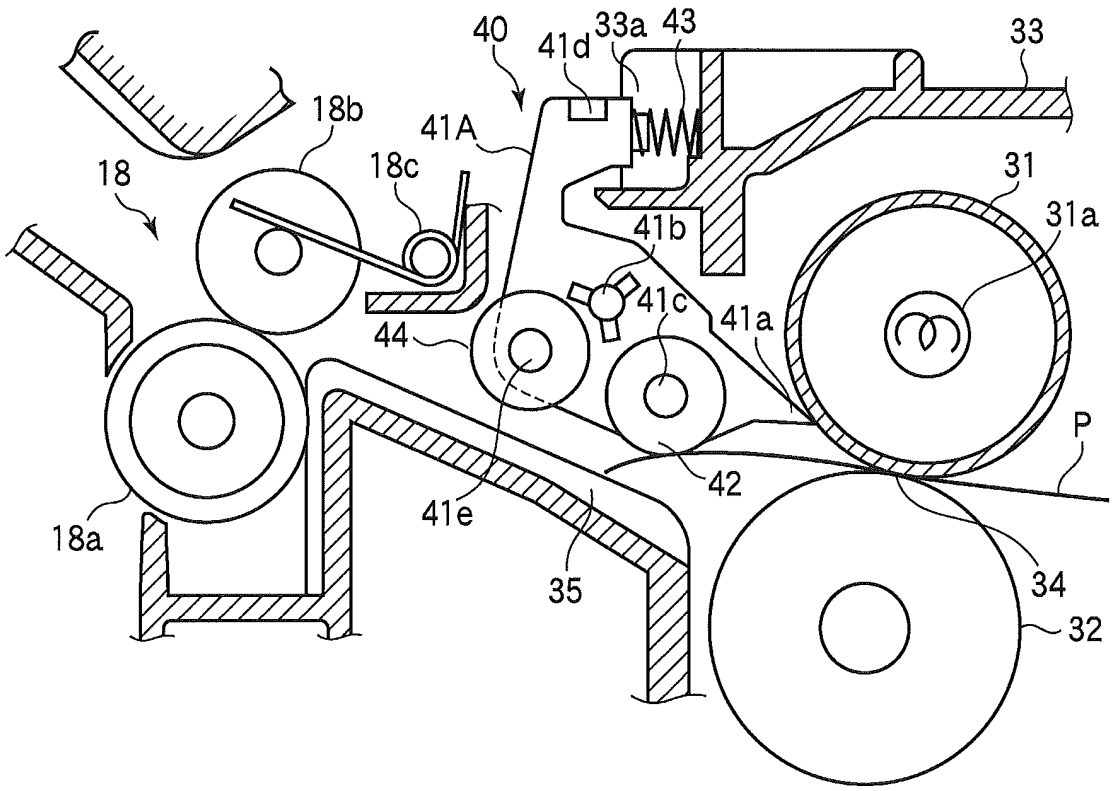
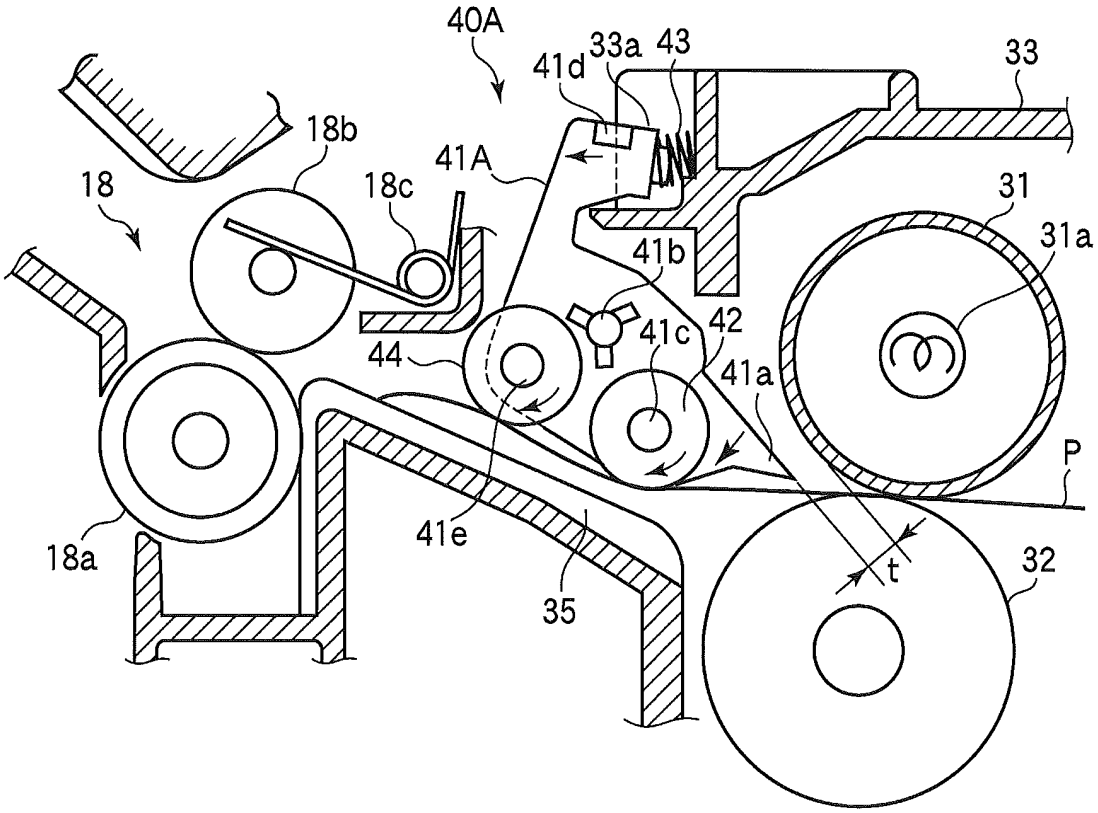

40
41d
33a
43
33
18b
41A
18
18c
31
31a
41b
41c
41a
44
P
42
41e
18a
35
34
32

FIG.13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18c
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41c
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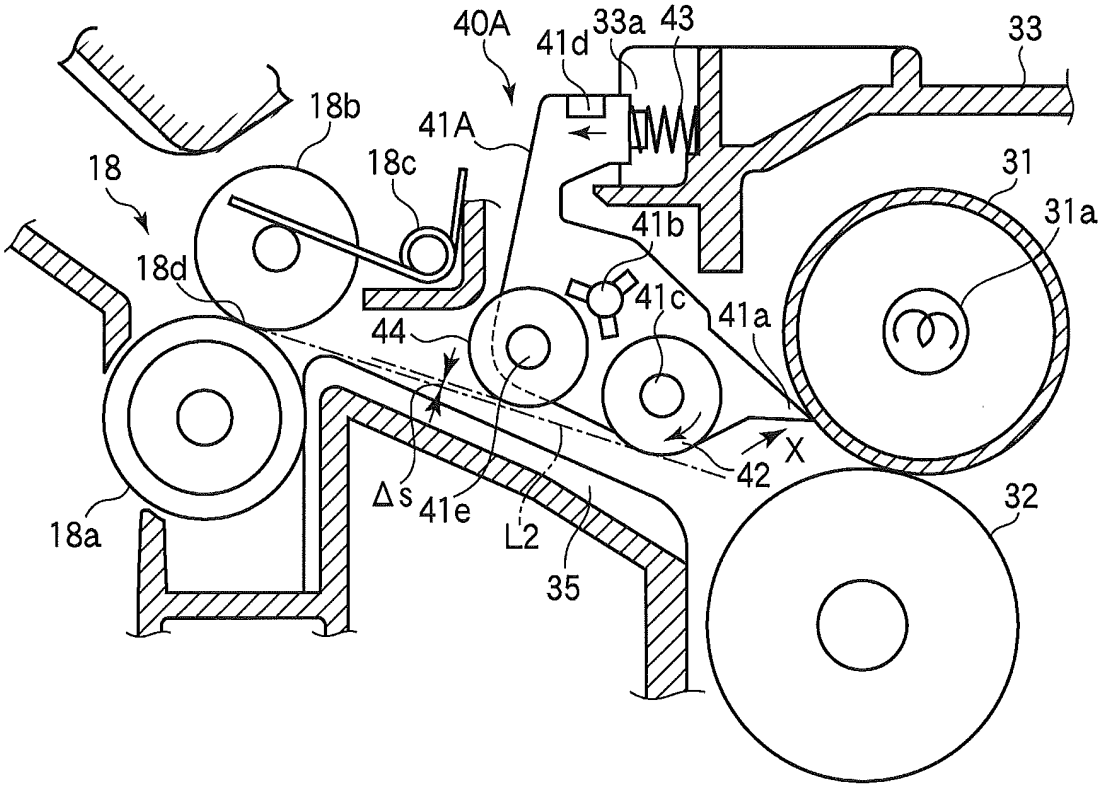
41a
P
18a
41e
35
t
32

FIG.14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43
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18b
41A
18c
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41c
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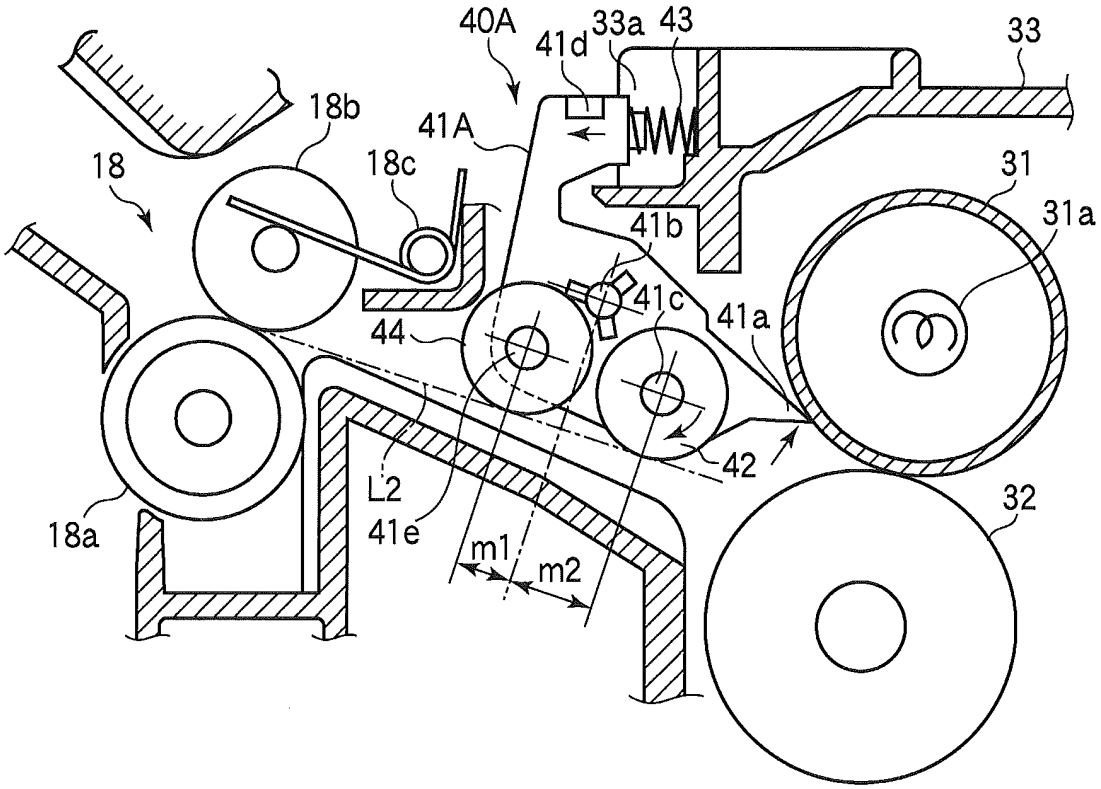
X
42
Δs
41e
L2
35
32
18a

FIG.15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43
33
18b
41A
18
18c
31
31a
41b
41c
41a
44
42
L2
41e
m1
m2
18a
32

REFERENCES CITED IN THE DESCRIPTION

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- US 6205316 B1 **[0005]**
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